



Discover a World of Opportunity™

Syllabus

I. General Course Information

Course Code: 05611

Course Title: Exploring Robotics/STEM S1

Department: Career & Technical Education (CTE)/Center for Communication Technology Magnet (CCTM)

School Level: High School

Grade Level: 9, 10, 11, 12

Primary Credit Type: Elective

Prerequisites: Students must apply to the CCTM program in order to be enrolled in this course.

Duration: 1 Semester

Credits per Duration: 5

Maximum Duration: 2 Semesters

Grading: DPS Standard

II. Course Description

In this dynamic technology class students get to work with Lego MINDSTORMS®, TETRIX®, and other robotics kits and components. Students learn basic programming with LabVIEW, and gain understanding in project management for robot construction and operation.

III. Course Outline

Introduction

Unit 1: Drive and Stop

Unit 2: Obstacle Detection

Unit 3: Follow the Line

Unit 4: Robot Chassis Construction

Unit 5: Basic Robot Programming

Unit 6: Arm and Gripper Construction

Unit 7: Arm, Gripper, and Robot Programming

Unit 8: TETRIX® Obstacle Detection

Unit 9: Line Following

Unit 10: FIRST Tech Challenge Competition

Engineering Design Process Overview

MINDSTORMS® Elements Inventory

TETRIX® Elements Inventory

IV. Standards and Assessments Coding

CTE Content Standard

ITPR.01 Identify and analyze customer software needs and requirements to guide programming and software development.

ITPR.01.02 Conduct requirements analysis.

ITPR.01.02.c Define the issue or opportunity to be solved by the application.

ITPR.02 Design a software application using the software development process to deliver a product to the customer.

ITPR.02.01 Utilize software development processes and methodology.

ITPR.02.01.a Demonstrate Problem analysis for a given software problem.

ITPR.02.02 Create design specifications of a computer application.

ITPR.02.02.a Design a software application that meets the requirements of the given problem.

ITPR.02.02.c Demonstrate the use of current design tools in the design process.

ITPR.03 Produce (code) a computer application to demonstrate proficiency in developing an application using the appropriate programming language.

ITPR.03.01 Demonstrate proficiency of programming language concepts.

ITPR.03.01.c Demonstrate knowledge of the basic principles for analyzing a programming program.

ITPR.03.02 Demonstrate proficiency in developing an application using an appropriate programming language.

ITPR.03.02.a Demonstrate knowledge of current key programming languages and the Interactive Development Environment (IDE) they are used in.

STCO.05.02 Implement trouble shooting techniques in problem solving.

STCO.05.02.a Gather knowledge to correct issues relevant to use and preventative maintenance. (the noisy belt, leaking window, screws to repair human joints, Hubble telescope).

STCO.05.02.b Analyze and interpret prior knowledge of tools, materials and processes to create a plan of action.

STCO.05.02.c Gather, analyze and interpret data and graphs regarding position, velocity and acceleration of moving objects.

STCO.05.02.d Develop new ideas to solve and eliminate recurring issues.

STCO.06.03 Utilize the design process.

STCO.06.03.a Demonstrate the design process by defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, and exploring possibilities.

STCO.06.03.b Select an approach, develop a design proposal, make a model or prototype, test and evaluate the design using specifications, refine the design, create or make it, and communicate processes and results.

STCO.06.03.c Understand that the design needs to be continually checked and critiqued, and the ideas of the design must be redefined and improved.

STCO.07.02 Use engineering principles.

STCO.07.02.a Understand that modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.

STCO.07.03 Understand the engineer's role in the design process.

STCO.07.03.a Understand the engineering profession has developed well tested sets of rules and design principles that provide a systematic approach as well as an ability to quantify the design process in order to improve efficiency.

STCO.07.03.b Demonstrate the ability to collaborate and work effectively with others.

STCO.07.03.c Use teamwork and leadership skills effectively.

Postsecondary & Workforce Readiness and Essential Skills

PWR.02.03.b Generate, evaluate, and implement new ideas and novel approaches

PWR.02.06.d Learn from instruction and criticism

PWR.02.07.f Demonstrate awareness of and evaluate career options

Academic Alignment with Math, Science, Reading, Writing and Communication (CCSS, CAS)

RWC10-GR.9-S.1-GLE.1-EO.b Use verbal and nonverbal techniques to communicate information

V. Additional Course Information

Fees: Determined by school. The lab fee is for equipment used in our curriculum that is not covered by the district. The equipment includes but is not limited to: TETRIX®, Lego MINDSTORMS®, and other disposables. If any student cannot afford the lab fee, see the department chair for a waiver.

Materials: Determined by School

Textbooks: Determined by School

Resources: Determined by School

VI. Final Notes

Assessment: Student growth will be determined using multiple measures. Instructor will utilize one or more of the following assessments: Pre- Post- test, engineering notebooks, robotics competitions and presentations, design & programming challenges and/or other project based assessment.